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OYAMADA YAHEI**(54) **HIGH DISTANCE-RESOLUTION OPTICAL  
TRANSMISSION LINE MEASURING DEVICE**

## (57) Abstract:

**PURPOSE:** To achieve a high distance resolution by providing a ring resonator optical circuit in that a ring waveguide path which has the same loop length as light pulse length and where a gain medium is added and a frequency shifter are formed on a crystal substrate.

**CONSTITUTION:** An optical pulse modulator 2 converts irradiation light of a coherence light source 1 to an optical pulse with a specified pulse length. A synthesizer 3 synthesizes an excitation light from a light source 8 for excitation and that from the modulator 2 and then transmits it to a ring resonator optical circuit 4. The circuit 4 has an optical waveguide 44 and a ring waveguide 45 which has the same loop length as the incidence light pulse length and where a gain medium is added, a directional coupler 46 which connects the optical waveguide 44 and the waveguide 45, and a frequency shifter 47 which is inserted halfway through the waveguide 45 for shifting the frequency of a passage light on a crystal substrate 41, thus enabling an output light to be an equivalent continuous light which changes stepwise. Also, the loop length can be equal to 0.01mm, thus achieving a high

distance resolution. Also, light pulse loss can be compensated by the waveguide 45 and the shifter 47 and loss in the circuit 4 can be reduced to 0.

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